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Unfreezing water quantity as a possible way of winter wheat frost resistance appreciation

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Abstract

The investigation of unfreezing water quantity change dynamics took place after the plant tissue suffered from the influence of membrane active substances which change water permeability: pipolphen (10-3 M), verapamil (10-4 M), CaCl2 (10-3 M), Gd(NO3)3 (2.5- 10-2 M). The measurements of unfreezing water quantity were made by a simple method on the automatic cogerent «home-made» NMR-plant working at 15 MHz. The objects of investigation were roots of different frost resistant winter wheat (Triticum aestivum) sorts: less frost resistant Mironovskya-808, and more frost resistant Kazanskya-84. The temperature range of unfreezing water quantity was -7° - -30 °C. We got to know that pipolphen and verapamil increase membrane water permeability together with the increase in the quantity of unfreezing water, and the most frost resistant sort Kazanskya-84 had the greatest quantity of unfreezing water in this temperature range. The addition of Ca2+-ions brought about the lowering of unfreezing water. The regularity of influence of the membrane active substances at-30 °C proves that changes in water permeability correlate with those in membrane hydration.